

Course Title: Microprocessors
Date: January 2013 (First term)Course Code: EC21
Allowed time: 3 hrsYear: 2nd
No. of Pages: (2)

Answer the following questions

Problem number (1) (18 Marks)

[a] Put (✓) or (x), then write correct statement (10 Marks)

- ~~1)~~ The code segment is limited to 64 Kbytes in 80386.
- ~~2)~~ In real mode, segments can begin at any location in the memory system.
- ~~3)~~ PUSH BX is equivalent to PUSH EBX
- ~~4)~~ MOV AX, DL
- ~~5)~~ STD
- ~~6)~~ MOV ES, DS
- ~~7)~~ REP STOSB
- ~~8)~~ AND AL, BL
- ~~9)~~ LES BX, CAT
- ~~10)~~ LEA CX, [BL] [BX]
- ~~11)~~ IN DX IN AX, DX
- ~~12)~~ PUSH 73H

[b] Draw the internal architecture of the microprocessor 80286 then describe the use of all registers. (8 Marks)

Problem number (2) (17 Marks)

[a] For the following instructions determine the data addressing mode and define its function. (8 Marks)

- Direct 1) MOV [1234H], BX
- Reg 2) DIV CH
- Base + index 3) ADD CL, [BX + DI]
- relative reg 4) MOV ARRAY[BX], AX
- reg indirect 5) MOV [BX], DH

[b] Comparison between: (9 Marks)

- 1) The real mode operation and the protected mode operation.
- 2) The 16-bit instruction mode and the 32-bit instruction mode.
- 3) LOOP instruction and JMP instruction.

Problem number (3) (20 Marks)

[a] In a machine language instruction, what is specified by the MOD field, the D and W bits found in some machine language instructions. (6 Marks)

[b] If a MOV DI, [BX + SI + 30_H] instruction appears in a program, what is its machine language equivalent? (6 Marks)

Op-code MOV is 22_H

| R/M code | Addressing mode | Code | REG field |
|----------|-----------------|------|-----------|
| 000 | DS: [BX + SI] | 011 | BX |
| 001 | DS: [BX + DI] | 110 | SI |
| 111 | DS: [BX] | 111 | DI |

[c] Describe the operation of each of the following instructions and the content of the destination operand in each instruction after execution assuming the initial values are DS = 0200H, BX = 4F82H (8 Marks)

- 4F83 1) INC BX
 BAH 2) SUB BH, 20H
 93E0 3) ROR BX, 2
 4082 4) AND BX, F0FFH

Problem number (4) (20 Marks)

[a] Suppose that DS = 0400H, BX = 0300H, SS = 0200H, SP = 0001H, and DI = 0400H. Determine the memory address accessed by each of the following instructions, assuming real mode operation: (7 Marks)

- 05235 1) MOV CX, [1234_H]
 11FF 2) PUSH BX
 04301 3) MOV DX, [BX]
 04300 4) INC BYTE PTR [BX]

[b] Explain the meaning of the following instructions: (13 Marks)

- 1) DATA 1000H .MODEL SMALL
 2) PUSH A
 3) MOV BX, OFFSET DATS
 4) CMOVS BX, DX
 5) OUT DX, AX
 6) OUTSB
 7) DATAS DW 20 DUP(7)
 8) MUL DI